A Study of Career Paths and Job Satisfaction

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I. Introduction

Making the right career decisions is hard. And yet as we spend most of our time at work, these choices have a sound impact on our lives and happiness. As students on the verge of graduating, we want to explore the factors that make people like or dislike their jobs, as well as the type of job transitions they realize. Our goal is to help people make optimal decisions regarding their careers. What criteria have an impact on job satisfaction, and how do they explain career moves?

We segment our analysis into two parts. First, we study criteria of satisfaction at work: what people say they look for as well as what they report for their current job. Then, we study usual job transitions people make and why.

II. Related literature

In order to gain insights on the problem, we select and study different papers. First, we analyze some studies on general job satisfaction, then we refine our approach to the specific career satisfaction notion. Finally, we try to identify relations between satisfaction and individuals' willingness for job transition/change.

A. Job satisfaction

Locke (1969) discusses the concept of *job satisfaction*. Locke's objective is to define this notion, and determine which factors can have influence on it. In his paper, he states that job satisfaction is an emotion resulting from the perception that a job facilitates or achieves the goals set and seen as valuable by an individual. Not only originating from internal causes (feelings, beliefs,...), job satisfaction is the result of a genuine interaction between the individual and his or her environment as well as social and cultural forces (Rosso, Dekas and Wrzesniewski, 2010).

B. Career satisfaction

Gattiker and Larkwood (1988) present the notion of *career satisfaction* as the affective consideration an individual feels towards his or her career. This is a particular element of the general job satisfaction. Someone content with his or her career/situation may be dissatisfied with his or her daily working conditions. The authors define numerous factors that drive career satisfaction, such as comparisons with co-workers/family/friends, family life, income or potential personal growth. Some criteria may be more important than others depending on the individual beliefs and interests. If an individual succeeds in fulfilling a criterion that he or she somehow deems important, it can be expected that this realization will trigger an increase in the individual's satisfaction.

C. Job transition

Hamermesh (1999) explains that a satisfied worker is less likely to voluntarily leave his or her job, even if his or her economic situation is not perceived as good as seemingly similar workers. In other words, intentional turnover and job satisfaction are negatively related. What's more, there is little relation between job satisfaction and persistent inequality of earnings between comparable job positions.

D. Summary

We observe that job satisfaction is an emotional response resulting from the interaction

of various external and internal factors. Job satisfaction and career satisfaction are the resultant of diverse criteria subjectively perceived as fulfilled or not by an individual. Finally, job satisfaction is negatively linked to the desire to quit. We may assume that this relation also works in the other way: a poor satisfaction at work may induce a desire to leave or change position. This desire may not automatically transmute into reality though, due to limitations such as diploma or personal problems.

III. Satisfaction at work

A. Job satisfaction: a survey on Mechanical Turk

What factors are important concerning job satisfaction?

First, we want to have a sense of what people consider important when it comes to job satisfaction. Is it salary, work/life balance, culture and values? We realize that those criteria vary by individuals, depending on their personality, their previous experience, their age and possibly many other factors. However we want to find patterns and be able to discover trends, depending on a few control variables. To try and answer this question, we designed a survey and posted it on Mechanical Turk (see the appendix for the precise questions).

After collecting answers from 220 participants and adjusting the results by age and gender based on the US population, we obtain the following ranking for best criterion of job satisfaction (Fig. 1).

Clearly two criteria outweigh all the others: salary and work/life balance. In order to gain additional insights, we then look at those results when aggregated by control variables: earnings, age and gender.

1) Effect of earnings on the ranking: We see that salary is the primary satisfaction criterion for low earnings workers:

- less than $12,500: 58% salary and 30% work/life balance
- $12,500 - $24,999: 47% salary and 27% work/life balance

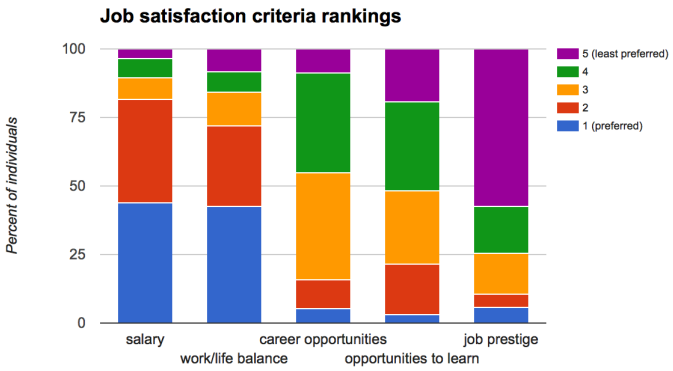

Fig. 1. Job satisfaction criteria rankings

Work/life balance is predominant for high earnings workers:

- $100,000 or more: 62% work/life balance - 31% salary
- $87,500 - $99,999: 61% work/life balance - 29% salary

2) Effect of age on the ranking : Because of the small size of our sample, we cannot conclude for the effect of the age. However we expect that prestige and salary would be important for young workers to later be replaced by work/life balance and culture as the individual gets older and more mature.

3) Effect of gender on the ranking: Computing the ranking distribution for our job satisfaction criteria and splitting by gender, we observe some discrepancies (Fig. 2). Male participants tend to largely favor salary over work/life balance, while the trend is inverted for females who value work/life balance more than salary which comes second.

4) Limitations: Let's note some limitations for our study. First our sample is quite small making it hard to aggregate data (say per age) in a statistically relevant manner. Then, our data is probably biased: people on Mechanical Turk may not actually be representing the general US population, especially regarding employment metrics.

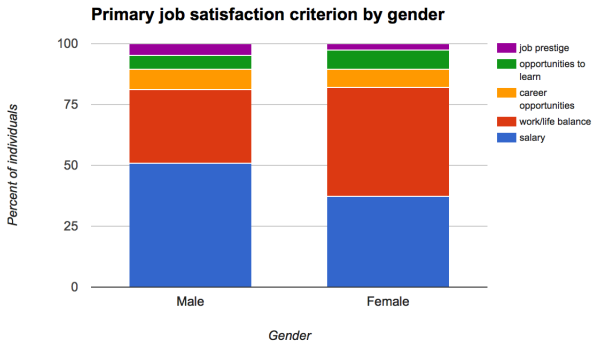

Fig. 2. Primary job satisfaction criterion by gender

B. Satisfaction by industry: scraping Glassdoor

Are job satisfaction criteria mutually compatible?

As observed previously, salary and work/life balance are the primary criteria for satisfaction at work. But is there a trade-off between the two of them? We may assume that those two criteria are incompatible: a good salary could mean a low work/life balance while having extra time could correlate with having a lower paying job.

In order to answer this question, we build a web scraper and collect data from glassdoor.com, a reference website providing a wide range of information about companies: reviews, interview questions,... We develop this scrapper in Python using the Selenium module as the content is dynamically generated. Our first task is to find which companies we would like to get ratings from. To do that we first perform a search on Glassdoor with specific keywords such as ”internet”, ”retail” or ”pharmaceutics”. We collect names of companies and number of reviews for each keyword. We then merge all the results doing an inner join. We keep only companies with more than 20 reviews, and end up with a list of 2000 companies. We then use our web scraper to get ratings for every company. We look for the following information: Industry — Sector — Number of ratings — Overall rating — Culture and values — Work life balance — Senior Leadership — Compensation and benefits — Career opportunities — Name CEO — Percentage approve CEO.

We use R to aggregate our data by industry (”Internet”, ”Wholesale”,...) and calculate the mean for every rating (Work life balance, Compensation and benefits,...). Then we are able to plot the results on a map by choosing two variables for which we want to study correlation. For instance, ”Work life balance” VS ”Compensation” map (Fig. 3).

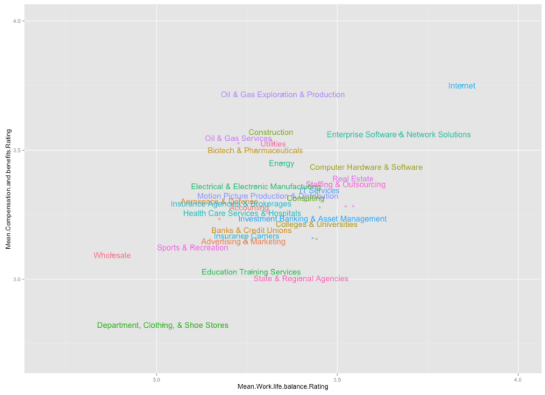

Fig. 3. Work life balance VS Compensation map

Our key finding is that some industries appear to be better (assimilating better with a higher rating) than others without any clear trade-offs between distinct criteria. Our proposed hypothesis was wrong. For example, by working for the ”Internet” industry, it seems possible to get both a good compensation and a good work/life balance.

Fig. 4 depicts the top 3 industries (best ratings) while Fig. 5 shows the worst 3 industries in each category.

Overall top	Compensation	Work/Life balance	Opportunities	Culture
-Internet -Enterprise Software -Staffing & Outsourcing	-Internet -Oil & Gas Exploration & Production -Enterprise Software	-Internet -Enterprise Software -Computer Hardware & Software	-Internet -Real Estate -Enterprise Software	-Internet -Enterprise Software -Real Estate

Fig. 4. Top 3 industries regarding specific ratings

Overall worst	Compensation	Work/Life balance	Opportunities	Culture
-Wholesale -State & Regional Agencies -Department, Clothing, & Shoe Stores	-Department, Clothing, & Shoe Stores -State & Regional Agencies -Education | Training Services	-Wholesale -Department, Clothing, & Shoe Stores -Sports & Recreation	-Wholesale -State & Regional Agencies -Department, Clothing, & Shoe Stores	-Wholesale -State & Regional Agencies -Aerospace & Defense

Fig. 5. Worst 3 industries regarding specific ratings

C. Job satisfaction through the lens of Glassdoor

What is the correlation between different criteria and job satisfaction?

Asking people about job satisfaction on Amazon Mechanical Turk helped us get an understanding at a granular level (as we got information such as age, gender and income) but the study was limited to 220 participants. One other way to look at the question is to look at the correlation between ”Overall rating” and other variables on Glassdoor ratings. The advantages is that we have thousands of companies and hundreds of reviews per company. Below are displayed correlations between ”Overall rating” and ”Compensation” as well as ”Overall rating” and ”Work/Life balance” , aggregated by industry (Fig. 6).

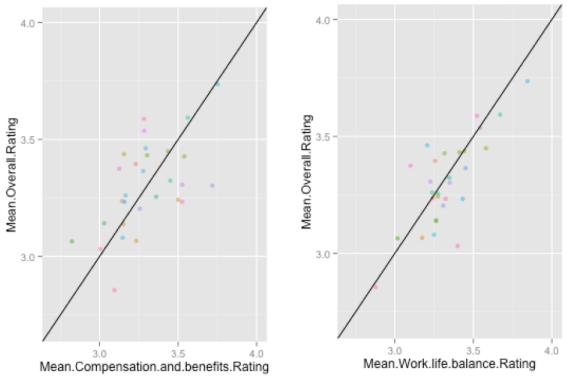

Fig. 6. Overall rating VS Compensation and Overall rating VS Work/Life balance maps

We observe a clear correlation both for compensation as well as work/life balance, confirming the result from the survey. However we realize that the correlation is even better for work/life balance, suggesting that this criterion should be the primary factor for job satisfaction. See below for additional maps (Fig. 7, Fig. 8).

Fig. 7. Overall rating VS Career opportunities rating and Overall rating VS Senior leadership rating maps

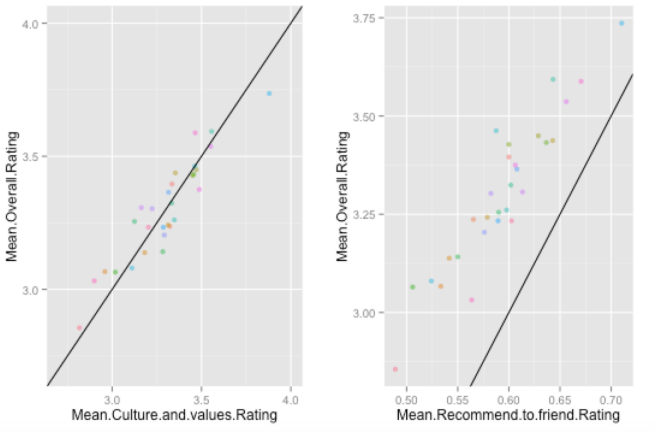

Fig. 8. Overall rating VS Culture and values rating and Overall rating VS Recommend to friend rating maps

We find a good correlation for culture and value and the overall rating. Interestingly, we can notice that all the points are above the line for career opportunities and leadership, indicating that people evaluate those two criteria more severely than the overall rating.

IV. Job transitions

A. A graph of job transitions: leveraging the Glassdoor API

After getting insights on job satisfaction, we want to get a sense of general careers paths and study the reasons why people decide to change job. To do that we use the Glassdoor API which provides data on job transitions. Given a specific job, the API returns the most probable job transitions as well as the median salary for those jobs.

We develop a Python script to make requests to the API. Given the results for one request, we store on a queue each job from the transitions in order to visit them later. We pick diverse starting points to try to get an exhaustive network, and to be able to cover all possible jobs. Our starting points are *'software engineer', 'engineer', 'surgeon', 'dentist','doctor', 'physician', 'lawyer', 'architect', 'assistant professor', 'artist', 'geologist', 'recruiter','legal intern','public relations intern'*. We then visualize our results using Gephi (Fig. 9).

We filter by the number of transitions to get rid of the transitions that do not occur very often, and end up with 18272 edges and 2216 nodes. Each node represents a job and the weight of an edge between two nodes is proportional to the number of transitions that occurred at some time in Glassdoor job transitions history.

We can compute global statistics of the network (Fig. 10).

- Density: 0.004
- Diameter: 19
- Average path length: 6.6
- Average clustering coefficient: 0.307

The network has some characteristics of a social network (short average path length, high clustering coefficient) but on the contrary has a large diameter (which is expected because some jobs are really specific and can be very far apart). We can notice that the network is fully connected.

It is interesting to note that management jobs are at the center of the graph. Also jobs related to software are very central (software engineer is one of the most central nodes) as we can see on the graph.

B. Clustering

We use the Louvain modularity algorithm to create clusters within our graph. After adjusting the parameter that impacts the number of distinct clusters, we obtain 22 groups. We find this value to be satisfying.

One key insight is that clusters correspond to occupations rather than industries. Overall, we remark a natural bias towards tech jobs (moderate/high skills), a few clusters being in the IT sector. A few examples of jobs found within clusters (names of clusters are manually added) are given on Fig. 11.

We decide to compute some statistics for the clusters. We have that 64% of all transitions occur inside clusters. This means that people get specialized: once they develop a certain expertise, it is hard to find a job in a new type of sector, which makes senses.

It is interesting to note that there is a low mobility from low salary clusters ($<$ \$50,000 median salary) to other clusters (we remark that the global mean median salary is \$76,570, which supports the assumption that Glassdoor is biased towards medium to high profile jobs). This is due to the fact that the people in those clusters do not necessarily have specialized skills, and get stuck with jobs that do not require expertise. On the other hand, middle/high salary clusters ($>$ \$50,000) present an increased mobility to higher salary clusters. Finally and not surprisingly there is a low mobility outside of very high salary clusters ($>$ \$100,000). This makes senses as people rarely have a strong decrease in salary.

More granularity on our data: inside a cluster

While transitions between clusters are quite informative, transitions within clusters are harder to analyze between similar types of

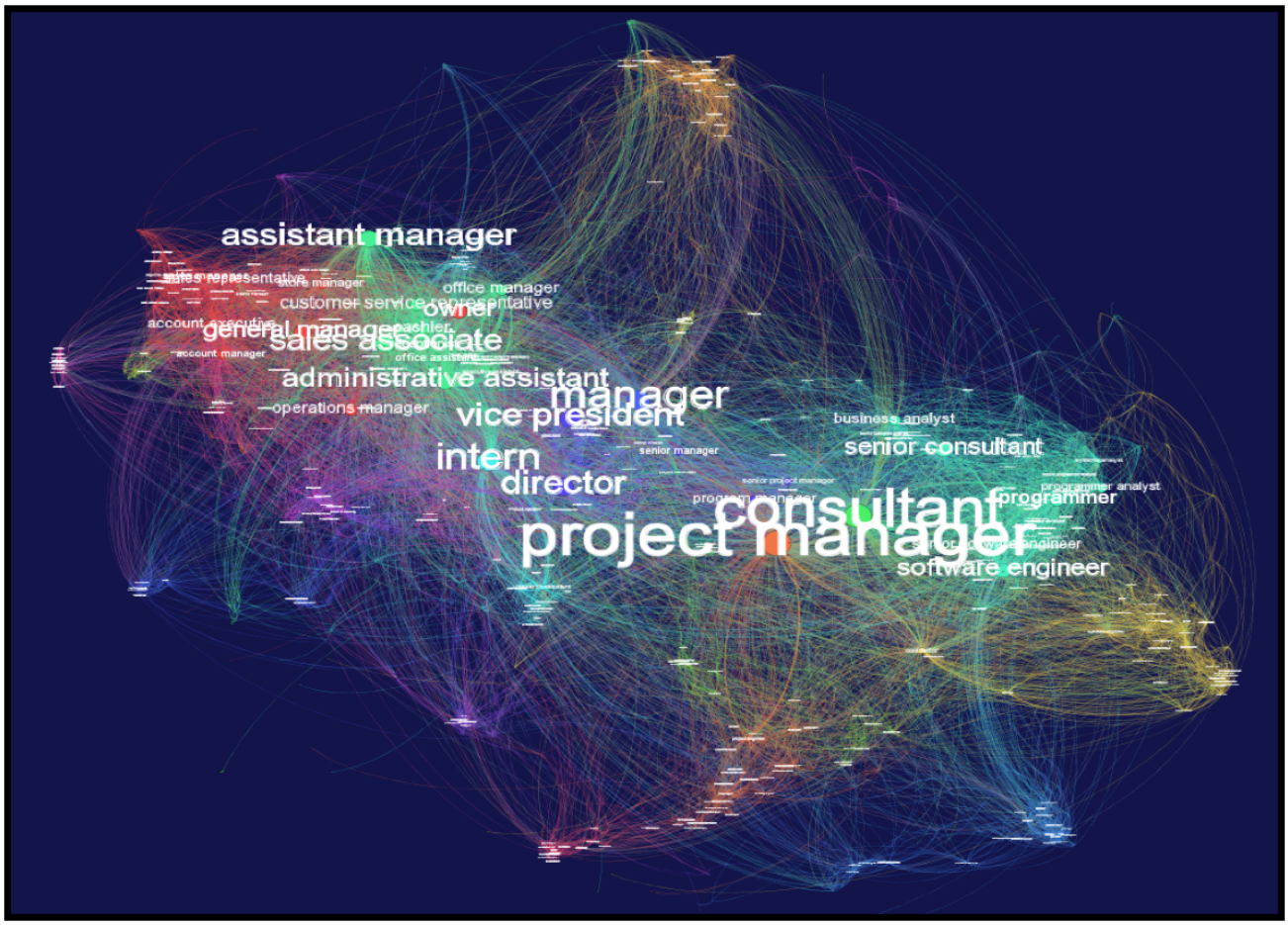

Fig. 9. Visualization of the graph of job transitions

10 most important nodes (Weighted in-degree):	Top 10 betweenness (indicate bottlenecks in network):
• Project manager • Administrative assistant • Director • Consultant • Manager • Sales associate • Intern • Vice president • Assistant manager • Cashier	• Project Manager • Software engineer • Sales associate • Project engineer • Business analyst • Consultant • Manager • Intern • Director • Medical assistant

Fig. 10. Some relevant nodes (jobs)

IT (software testing)	HR	Operations	Upper management
• qa engineer • software engineer • test consultant • firmware engineer	• regional recruiter • hr manager • benefits manager • recruiting consultant • staffing specialist	• merchandise planner • supply chain manager • strategic sourcing manager • project scheduler	• CIO • executive officer • portfolio manager • chief of staff

Fig. 11. Some random jobs in different clusters

jobs. For example there are a lot of transitions between ”software engineer” and ”software developer” but those are not really helpful without access to more granular data. Indeed the median salary is aggregated for all data points for a specific job. While someone can leave a software developer job to a higher paying software engineer job at another company, the opposite may also be true. Aggregated data is uninformative in this respect. This is why we decided to scrap Glassdoor again but this time by filtering per job position. We gather ratings for 200 popular tech companies for different

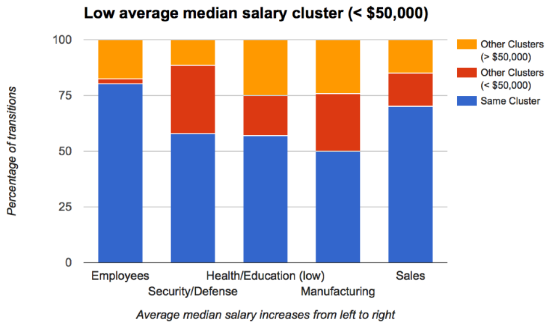

Fig. 12. Clusters with lowest average median salaries

popular jobs (Product Manager, Software Engineer, Data Analyst,...) and compute means across companies (Fig. 13).

Job	Overall	Culture Values	Work Life Balance	Senior Management	Comp Benefits	Career Opportunities
Data	3.407	3.417	3.484	2.964	3.422	3.185
PM	3.446	3.466	3.519	2.987	3.465	3.206
Software	3.428	3.453	3.591	2.951	3.44	3.208
Senior Software	3.392	3.45	3.567	2.946	3.447	3.184

Fig. 13. Some random jobs in different clusters

We also compute the variance between companies for those jobs (say for ”Software Engineer”, the variance of ”Overall rating” for the 200 companies). It is interesting to note that those variances are higher than the variances of jobs across one single company. This means that choosing the right company is often more important than choosing the right job (say software vs. date science) within one cluster.

V. Limitations and Future Work

A. Limitations

As mentioned above, our data might be biased. This is true for the data obtained through Mechanical Turk as well as through Glassdoor (biased towards tech workers).

Glassdoor data lacks granularity. For example, we cannot access basic demographics, such as age and gender. One of our hypothesis was that a lot of job transitions are likely to happen early in someone’s career. But this is impossible to verify without ”age” data. Another limitation already mentioned is that the data is aggregated, rendering transitions such as ”Software Engineer to Software Developer” quite uninformative.

Overall, while we have outlined the ”what”, it is hard to know the ”why”. For example job transitions could be caused by external pressures (e.g. job obsolescence due to technology, individual’s hierarchy) as well as internal motivations (e.g. boredom or stress, ethics, ambition and prestige). We expect the outcome to be radically different for each scenario (voluntary VS forced). Unfortunately we do not have this data.

B. Future work

It would be interesting to add transitions from education (say a link from CS degree to ”software engineer”) in order to study career evolution as a function of education. Scrapping LinkedIn could also prove useful for this task.

It would also be insightful to look at the evolution of graph over time.

Finally, it would be interesting to correlate our graph with job postings to study supply/demand in the labor market (neoclassical economics theory).

VI. Conclusion

People are mainly motivated by money and a good work/life balance. People with high paying jobs consider work/life balance first while low paid workers place salary at the top. Overall some industries are better perceived than others: Internet, Software,... with no clear trade-offs between different criteria (say Compensation VS Work/Life balance).

From our graph, we see that low skilled jobs present a high horizontal mobility while skilled jobs present a high vertical and low occupational mobility. Also it seems that choosing the right company is more important than choosing the right job (for close type of jobs such as ”Software Engineer” VS ”Data Scientist”).

VII. Appendix:

A. Amazon Mechanical turk Survey

- What is your gender?
  - Male
  - Female
- What is your age?
- Which of the following best describes your highest achieved education level?
  - Some High School
  - Some college, no degree
  - Associates degree
  - Bachelors degree
  - Graduate degree (Masters, Doctorate,...)
- What is the total income of your household?
  - Less than $12,500
  - $12,500 - $24,999
  - $25,000 - $37,499
  - $37,500 - $49,999
  - $50,000 - $62,499
  - $62,500 - $74,999
  - $75,000 - $87,499
  - $87,500 - $99,999
  - $100,000 or more
- Do you have another job apart from Mechanical Turk?
  - No
  - Full-time job
  - Part-time job
- Approximately how many jobs did you have in your life?
- On average, how many hours do you work a week?
- Please rank the following job satisfaction criteria in the order you deem the most appropriate, 1 being the most important.
  - Salary
  - Career opportunities
  - Work/life balance
  - Job prestige
  - Opportunities to learn and develop skills


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Fig. 14. Example of API call result for job transition

B. Glassdoor API

VIII. References

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